

Claims

9. (Currently amended) A method for operating a fixed bed reactor having an operating life for reacting a feedstock said fixed bed reactor comprising a fixed catalyst bed having a top layer and a bottom layer, wherein during operation of said fixed bed reactor a feedstock flow passes through said fixed catalyst bed and a pressure drop across said top layer of said fixed catalyst bed increases during reaction of said feedstock due to fouling of said top layer of said fixed catalyst bed, the method comprising:

(a) placing a bypass apparatus within said fixed catalyst bed in substantial alignment with said feedstock flow through said fixed catalyst bed said bypass apparatus comprising,

a cage member embedded in the catalyst bed comprising a first elongated hollow member having a top wall, side walls and a bottom wall, said cage member having openings therein , and

a second hollow elongated member for bypassing an increasing amount of said feedstock through said second hollow elongated member into said cage member as said top layer of said fixed bed fouls to create a bypass flow, said second hollow elongated member being disposed within said cage member and protruding through said top wall of said cage member and wherein said second hollow elongated member extends above said fixed catalyst bed through said cage member, said second hollow elongated member being sized to regulate said bypass flow, said age member having a substantially larger cross-section than said second hollow elongated member so that said bypass flow exists from said cage member into said bottom layer of said fixed catalyst bed at an effectively reduced velocity,

(b) introducing said feedstock into said fixed bed of catalyst material, wherein a majority of said feedstock will flow through said top layer of said fixed bed of catalytic material, and

(c) as said top layer of said fixed bed of catalytic material fouls, bypassing said increasing amount of said feedstock to said bottom layer of said fixed bed of catalytic material thereby extending the operating life of said fixed bed reactor; wherein said second hollow elongated member is continuously open to said bypass flow.

10. (Previously presented) The method of claim 9, wherein said feedstock is a hydrocarbon feedstock selected from the group consisting of liquid feed, vapor feed, and mixtures thereof.

11. (Previously presented) The method of claim 9, wherein said feedstock is selected from the group consisting of hydrocarbon feedstocks, and mixtures thereof.

12. (Currently amended) A method for extending an operating life of a fixed catalyst bed reactor, the method comprising:

providing a reactor comprising at least one fixed catalyst bed ;

establishing a feedstock flow through said at least one fixed catalyst bed partitioning said at lease one fixed catalyst bed in to a top layer and a bottom layer by placing a bypass apparatus within said at least one fixed catalyst bed in substantial alignment with said flow of said feedstock, said bypass apparatus comprising,

a cage member embedded in the catalyst bed comprising a first elongated hollow member having a top wall, side walls and a bottom wall, said cage member having openings therein, and

a second hollow elongated member for bypassing an increasing amount of said feedstock through said second hollow elongated member into said cage member as said top layer of said at least one catalyst fixed bed fouls to create a bypass flow, said second hollow elongated member being disposed within said cage member and protruding through said top wall of said cage member and wherein said second hollow elongated member extends above said at least one fixed catalyst bed through said cage member, said second hollow elongated member being sized to regulate said bypass flow of said feedstock into said cage member, said cage member having a substantially larger cross-section than said second hollow elongated member so that said bypass flow exits from said cage member into said bottom layer of said at least one fixed catalyst bed at an effectively reduced velocity,

bypassing said increasing amount of said feedstock flow through said bypass apparatus to the bottom layer, as said top layer fouls;

wherein said second hollow elongated member is continuously opened to said bypass flow.

14. (Previously presented) The method of claim 12, wherein said second hollow elongated member is a tubular member having a diameter from about 0.25 to 12 inches.

15. (Previously presented) The method of claim 12, wherein said cage member is a tubular member having a diameter of about 3 to 20 inches.

16. (Previously presented) The method of claim 12, wherein said second hollow elongated member has a pressure drop of about 5 to 50 times greater than that of said at least one fixed catalyst bed when said at least one fixed catalyst bed is a fresh catalyst bed.

17. (Previously presented) The method of claim 12, wherein said bypass apparatus further comprises a separation device disposed above said second hollow elongated member.

18. (Previously presented) The method of claim 12, further comprising a separation device selected from the group consisting of caps, centrifugal separators and cyclones.

19. (Previously presented) The method of claim 12, wherein said at least one fixed catalyst bed contains packing material for distributing particulates passing through said bypass apparatus.

20. (Previously presented) The method of claim 19, wherein said packing material is selected from the group consisting of catalyst particles, alumina balls, inert particles, inert packing and mixtures thereof.